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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,592	08/26/2003	Shinichiro Yanagawa	A1585.0007	2404
32172	7590	07/14/2006	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP 1177 AVENUE OF THE AMERICAS (6TH AVENUE) 41 ST FL. NEW YORK, NY 10036-2714			SINGH, PREM C	
			ART UNIT	PAPER NUMBER
			1764	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/647,592

Applicant(s)

YANAGAWA ET AL.

Examiner

Prem C. Singh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

The new abstract is noted.

Addition of new claims 4-12 is noted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsuo et al (EP 0 508 835 A2) in view of Kocal (US Patent 4,783,567).

Mitsuo invention discloses a method of preparing 4-alkyl-and/or 4, 4'-dialkyl biphenyls which are useful as a thermal medium, a solvent for pressure-sensitive copying paper, and a precursor of a liquid crystal molecule (Page 2, lines 1-3). Use of a solid catalyst as the catalyst is advantageous with respect to the aforementioned problems. There have been known various methods of alkylating biphenyl with a solid acid catalyst. For example, Japanese patent application laid-open No. 156222/1981 discloses a method of preparing alkyl biphenyls rich in meta- and para- forms using a silica-alumina catalyst (Page 2, lines 18-21). In the present invention, the alkylating agent used for alkylating the biphenyls or 4-alkyl biphenyls are preferably olefins, aliphatic alcohols, alkyl halides, and polyalkyl benzenes. Olefins and polyalkyl benzenes are particularly preferred. Among olefins, propylene and butane are preferred (Page 3, lines 47-49). As the phosphorus source for the catalyst used in the present invention, any phosphorus compounds may be used. For example, phosphoric acids and salts

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thereof, phosphates, phosphoric halides, phosphines, and the like can be used. Among them, phosphoric acids and salts thereof are preferred (Page 3, lines 53-55). In the present invention, the alkylation of biphenyl or 4-alkyl biphenyls or derivatives thereof in the presence of the catalyst containing phosphorus and having a zeolite structure may be carried out either in a gas phase or liquid phase (Page 5, lines 11-13). Molar proportion of biphenyls or 4-alkyl biphenyls to the alkylating agent is preferably 5/1 to 1/20, and more preferably 1/1 to 1/10 (Page 5, lines 28-29). The reaction may be carried out either in a continuous system or in a batch system. In both systems removal of the catalyst from the product is easy. The reaction product obtained in the method of the present invention can be removed and purified by distillation or the like (Page 5, lines 32-35). Mitsuo invention discloses in Table 2 (Page 9) the distribution of mono-di- and tri- substituted and ortho-, meta-, and para- form of alkylated biphenyls, including 4,4'-dialkylbiphenyl.

Mitsuo invention does not disclose recycling a fraction of the biphenyl and monoalkyl biphenyl to the reactor.

Mitsuo invention does not specifically mention concentration of dialkyl biphenyls to be 15% by mass and amount of dialkyl biphenyls to be 30% by mass .

Mitsuo invention discloses in Table 3 (Page 10) the composition of biphenyl, mono- substituted and di- substituted biphenyls to be 5%, 40%, and 55% respectively. It would have been obvious to one skilled in the art at the time the invention was made to modify Mitsuo invention and use the claimed composition and mass by using a recycle

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stream. This will help reduce the heavy components and increase the desired components.

Mitsuo invention does not disclose a fixed bed reactor system.

Kocal invention discloses a process for the liquid phase alkylation of an olefin acting agent with a hydrocarbon substrate in the presence of an acid alkylation catalyst (Column 1, lines 36-39). The alkylation reaction zone is characterized in that it contains a fixed bed of particulate contact material which occupies a portion to all of the volume of the reaction zone. The reaction mixture is passed through the fixed bed of particulate contact material and into a separator. In the separator, the acid catalyst is separated from the product hydrocarbons (Column 1, lines 43-50).

It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Mitsuo and Kocal and use the fixed bed disclosed in Kocal invention, pack with the catalyst disclosed in Mitsuo invention and carry out the reaction between biphenyl and the olefin in the continuous fixed bed reactor. Fixed bed operation gives a better contact between the reactants, easily controllable residence time, and thus, the desired product distribution.

Response to Arguments

The Applicant argues that Mitsuo invention does not teach or suggest recycling

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A fraction of biphenyl and mono-alkylbiphenyl. No basis for the examiner's assertion is set forth nor is any apparent.

The Applicant's argument is not persuasive because Mitsuo maintains a molar ratio of biphenyls or 4-alkyl biphenyls to the alkylating agent as 5/1 to 1/20 (Page 5, lines 20-21), although Mitsuo does not specifically mention about recycling. Kocal does teach a recycle, "The product hydrocarbon of the separation zone (11) are recovered through line (12) while the recycle hydrocarbon substrate is recycled to the reaction zone through line (4)." (Column 2, lines 66-68; column 3, lines 1-2). Thus, one skilled in the art would combine the teachings of Mitsuo and Kocal and use a recycle as explained in the Office Action above.

The Applicant argues that dialkyl biphenyls having an ortho- position substituent have low boiling point and the inclusion of either 4,4-dialkyl biphenyl or ortho-substituted dialkyl biphenyls is undesirable when using the product as a pressure sensitive paper solid. Mitsuo also does not teach or suggest these problems or how to solve them.

The Applicant's arguments are not persuasive because the above-mentioned problems have not been claimed. The discussion from the specifications can not be imported to the claims.

The Applicant argues that Mitsao has an object of preparing 4-alkyl products with selectivity. It does not disclose a method for reducing the content of 4,4'-dialkybiphenyls in the product, much less disclose how to reduce the content by the feature specified in

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claims 2 and 3. The Examiner will note that Mitsuo Example 6-12 in the reference show proportions of 4,4'-disubstituted alkylbiphenyl in disubstituted dialkybiphenyls to be in the range of 79-88 percent.

The Applicant's argument is not persuasive, because Mitsuo Examples (comparative) 1, 2, and 3 show the proportion in the range of 30 to 44 percent.

The Applicant argues that Kocal patent has been cited only to show a fixed bed reactor. Thus, the combination with Mitsuo can not render the claimed invention obvious.

The Applicant's argument is not persuasive because Kocal reference has been cited to show a fixed bed reactor and the hydrocarbon recycle. Both references teach alkylation process using similar feeds and similar catalysts, their combined teachings make a *prima facie* case of obviousness.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 6:30 Am-3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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